Integrating Action on Air Pollution and Climate to Improve Public Health

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Health Effects Institute

Independent Research Institute Providing Trusted Science

- Rigorous science
- Global experts

Targeted Research and Reanalysis

Over 350 studies on a wide variety of air pollutants and sources PM, ozone, air toxics; coal, diesel, natural gas, others Targeted studies in 30+ countries

Scientific Review

The Health Effects of Exposure to Traffic Health Effects of Air Pollution in Asia

Global Health

- The State of Global Air
- Global Burden of Disease- Major Air Pollution Sources
- Work in regions including South Asia, Southeast Europe





ESEARCH REPORT

Mortality and Morbidity Effects of Longferm Exposure to Low-Level PM_{2.5}, BC, NO₂, and O₃: An Analysis of European Cohorts in the ELAPSE Project

Hunstheyed, Marsinj Storak, Jie Chen, Zonman J. Andersen, Bichard Allinner, Lange, Chailla Cossensel, Hannores Ortenation, Daniela Herder, Jane Callero, Lange, Chailla Cossensel, Hannores Ortenatione, Daniela Herder, Jane Callero, Hander Mark, Barner Mark, Barner Hanner, Barner Marken, Matthias and Mark, Calorison Router, Jonester Jengemese, Danie Katsenyamo, Matthias and Markin, Galorison Router, Bonner Hong, Marcel, Dani, Martha Kathan, Calorison Router, Barner Hergunger, Nach, Statoseyamo, Matthias and Markin, Galorison Router, Barner Hergunger, Marken Mark, and Allen, Galorison Router, Barner Hergunger, Marken Mark, Marken Kathan, Kathan, Sangka, Hanni Kathan, Sangka, Danieliki Wenman, Galoran Manyur, Kathan Walk, and Gerand Hode.

ESN 1641-565 ION 2006 665



Institute for Health Hetrics and Evaluation's Global Burden of Disease project. Nation: Health Effects Institute: 2020. Scient Air 2020. Special Report. Boston, MA Health Effects Institute: SSN 2578-6873 © 2020 Health Effects Institute

Pathways linking climate, air quality, energy to health

Highly Potent Short-Lived Climate Pollutants—Sources and Impacts





Smith et al., 2013 https://www.ccacoalition.org/en/blog/curbing-climate-change-and-preventing-deaths-air-pollution-go-hand-hand



K Annu. Rev. Public Health. 34:159–88



What are the major sources of air pollution and greenhouse gases, and how do they contribute to health impacts?



What are their relative contributions to the burden of disease?

Motivation for action



What kind of actions would it take to achieve substantial improvements in the future?

5 Key Messages

Air pollution is the 4th largest risk factor for disease and death worldwide, surpassed only by diet and smoking.

Global levels of ozone – both a product of and contributor to global warming – have been slowly but **steadily increasing over the last decade**.

In the last decade, although there has been some improvement in high income countries, **global PM**_{2.5} **levels have stagnated** while its associated global burden of disease has continued to climb, driven by conditions in South Asia and Africa.

Combustion of fossil fuels (coal, oil, and natural gas) contributes to over 1/4th of all air pollution deaths globally.

Use of solid fuels in residential settings is a key contributor to health impacts. Access to clean energy can contribute towards achievement of climate, air quality and health goals.

Air pollution's contribution to burden of disease is not borne equally across the world.





Number of Deaths Attributable to Household Air Pollution from Solid Fuels in 2019



Air pollution is the 4th leading risk factor for premature death and disability

High systolic blood pressure

Tobacco

Outdoor and household air pollution linked to 12% of global deaths in 2019

 $2/3^{rd}$ of all deaths are linked to outdoor air pollution

Dietary risks

High body-mass index

High LDL

Kidney dysfunction

Malnutrition

Alcohol use

Global ranking of risk factors by total number of deaths from all causes in 2019.



Air pollution makes a significant contribution to the non-communicable disease burden.



Percentage of global deaths from specific causes attributable to total air pollution.

Disease burden – communicable and noncommunicable diseases



Global levels of ozone have been slowly but steadily increasing over the last decade.



Regional trends in seasonal 8-hr max ozone, 2010 -2019

2010

Number of countries in each WHO guideline category for seasonal ozone



State of Global Air 2020 State of Global Air Special Analysis 2022

Tropospheric Ozone

Secondary air pollutant

11% of global COPD deaths in 2019 were linked to ozone exposure.

365,000 deaths worldwide in 2019

Short-lived climate pollutant

Significant implications for climate, health, food production and security



www.ccacoalition.org/ozone

https://www.ccacoalition.org/en/slcps/tropospheric-ozone

Global PM_{2.5} levels have stagnated over the last decade.



IT-2 (25 ug/m³)



State of Global Air

Number of countries in each WHO guideline category for annual ambient PM2.5



State of Global Air 2020 State of Global Air Special Analysis 2022

Major global sources of PM_{2.5}

Major sources include residential energy use (19.2%), industrial processes (11.7%), and energy generation (10.2%)

Significant variability across regions



McDuffie et al., 2021

Proportion of Population Using Solid Fuels in 2019

Use of solid fuels in residential settings is a key contributor to health impacts.



Contribution to Population-Weighted PM2.5 by Source in 2019



ontribution to PM2.5 (%) in 201 10 15 20 25 30 35

McDuffie et al. 2021 State of Global Air 2020

Access to clean(er) energy sources can help address climate, health and air quality

Percentage of the global population relying on solid fuels for cooking has dropped by 11% since 2010

More than 0.5 million deaths globally due to PM_{25} exposure can be prevented by eliminating solid biofuel combustion



Based on: WHO – Fuel for life: household energy and health. OurWorldinData.org - Research and data to make progress against the world's largest problems.



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https://ourworldindata.org/energy-ladder State of Global Air 2020

Combustion of fossil fuels contributes to over 1/4th of all air pollution deaths globally.



Contribution to PM2.5 (%) in 2019



McDuffie et al. 2021

Reducing fossil fuel use can help improve health, bring air quality benefits.



McDuffie et al., 2021

Case study: India

Energy and air quality are

intricately linked.





1990 2000

2010

2020

1970

1980





Figure S11. Time series of emissions in India, as a function of emission sector (all fuel types shown).

Addressing household air pollution to meet climate and health goals







Pandey et al. 2021 Apte and Pant 2019

LPG as a transition fuel for clean household energy

Solid fuel combustion- impact on climate, air quality, health

Liquefied petroleum gas (LPG)- significant social and health benefits particularly for women and children, improvement in air quality



Goldemberg et al., 2018

Coal combustion is a source for air pollutant and CO_2 emissions



(Left) Deaths attributable to 2018 power plants. (Right) Deaths attributed to 2018 plants and new plants.



Cropper et al. 2021

Coal use: impact on air quality, health & climate



https://india.mongabay.com/2018/11/quest-for-black-diamond-leaves-korba-breathless/ State Health Resource Centre (2020), Air Quality Report from Korba, Champa & Raipur.



Case study: China

"...without ambitious climate mitigation (eg, under current NDC pledge), Chinese deaths related to $PM_{2.5}$ air pollution might not always decrease—and might often grow—by 2050 compared with the base year of 2015, regardless of clean-air policies and air quality improvements"



B Current-pollution and NDC goals

Case study: Ghana

Focused action on household energy, transportation can help address climate and air quality goals. Alignment between the National Action Plan to Mitigate Short-Lived Climate Pollutants and NDCs under the Paris Agreement

National Action Plan on SLCPs getting people access to 2 million fuel-efficient cookstoves

Bring air quality and health impacts into focus

Integrated work across different ministeries

Thank you!

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